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Sir:

Transmitted herewith for filing is the Patent Application of  
Inventor(s): Lorne TROTTIER al

For: REAL-TIME VIDEO EDITING ARCHITECTURE

Your Petitioner prays that Letters Patent may be granted for the invention set forth  
in the enclosed specification including a disclosure, claims and declaration.

Enclosed are:

- ☒ 4 ( 4 ) sheets of informal drawing(s).
- ☐ An additional copy of this sheet with an Assignment of the invention and Form PTO-1595.
- ☐ Form PTO-1449.
- ☐ Information Disclosure Statement.
- ☐ Declaration of Small Entity Status-Small Business Concern.
- ☐ A Certified Copy of on the basis of which the benefit of priority under 35 U.S.C. 119 is claimed.

|                        | No. Filed | Number Extra | Rate            | Basic Fee |
|------------------------|-----------|--------------|-----------------|-----------|
| Total Claims           |           |              |                 |           |
| Multiple Dependent Fee |           |              |                 |           |
| Independent Claims     | 2         | 0            |                 |           |
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|                        |           |              | Assignment Fee  |           |
|                        |           |              | Total:          |           |

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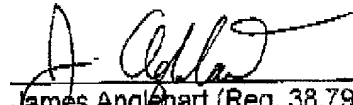
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Assistant Commissioner for Patents

This application is being filed without paying the Government Filing Fee. This application is also being filed with an Unsigned Declaration.



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## REAL-TIME VIDEO EDITING ARCHITECTURE

This application is related to copending US applications filed on the same day of the present application and entitled "Flexible video editing architecture with software video effect filter components" and "Method and apparatus for real-time video editing using a graphics processor".

### FIELD OF THE INVENTION

This invention relates to video editing. More precisely, this invention describes an architecture that allows real-time video editing.

### BACKGROUND OF THE INVENTION

Video editing has always been an important issue in video production. Film editing was initially done using splicing tools and title blending equipment. However, in recent few decades, new techniques appeared. One cornerstone in the evolution of these techniques was the beginning of the digital era. This new era opened new horizons and expanded dramatically the type of editing operations that could be performed on video streams. For instance, with this new era, it became possible to use the processing power of the computer.

Today video editing can be performed in a computer using two types of architecture.

The first type of architecture involves a dedicated 3D video special effects chip or chip set whose task is to perform only video editing operations and hardware implemented video effects. While this architecture allows real-time processing, which is a need for live broadcasting, this architecture suffers from a lack of upgradeability. Furthermore, this architecture is usually very expensive and thus not affordable for low end users.

This second type of architecture involves the common graphics chip used in computer graphics cards. This architecture allows video editing operations and video effects. Furthermore, this architecture allows a software upgrade of the video effects. However, this architecture cannot handle, in its present configuration, real-time

operations. This is a major drawback that is not acceptable for a professional user and is also a great inconvenience for personal users.

There is thus a need for an architecture that would allow real-time video editing without using expensive dedicated hardware. There is also a need for an architecture that would allow a software upgrade of the video effects that can be performed in real time.

#### SUMMARY OF THE INVENTION

It is an object of the invention to provide a video editing architecture allowing video editing using various sources of video streams,

It is another object of the present invention to provide a video editing architecture that would make use of the graphics processor in a computer,

Yet another object of the present invention is to provide a video editing architecture that would allow real-time video editing using the graphics chip located in the computer.

According to a broad aspect of the present invention, there is provided a video editing apparatus for performing video editing in realtime of at least two video streams derived from a codec able to retrieve two video sources from a data storage device and output two uncompressed video data streams. The apparatus comprises:

a video data storage device;

a graphics processor having at least two video inputs and a video output;

a video decoder having a video signal input and an uncompressed digital video output;

a video encoder having an uncompressed video data stream input and a display signal output;

a first video bus transferring data between the video output of the graphics processor and the video encoder when the apparatus is operating in a realtime video editing mode;



Preferably, the apparatus further comprises an input for compressed digital video input from external device, and a decompression device, one of the at least two video inputs comprising decompressed data from the compressed digital video input.

- 5 Preferably, the compressed digital video input comprises one of an IEEE 1394 interface and an SDTI interface.

#### BRIEF DESCRIPTION OF THE DRAWINGS

10 The invention will be better understood by an examination of the following description, together with the accompanying drawings, in which:

**Fig. 1** presents an overview of the architecture of the invention; this invention comprises a graphics chip;

**Fig. 2** shows a block diagram which describes actions to be performed to realize a fade effect using the architecture disclosed in the invention;

15 **Fig. 3** shows a block diagram which describes actions to be performed to realize a 3D perspective effect using the architecture disclosed in the invention;

**Fig. 4** shows a block diagram which describes actions to be performed to realize an organic wipe effect using the architecture disclosed in the invention;

20

#### PREFERRED EMBODIMENT

Figure 1 is a schematic block diagram of the real-time video editing system according to the preferred embodiment which is described herein to teach the preferred mode of implementing the present invention with limiting the scope thereof as defined in the appended claims. While illustrated in the block diagram of Figure 1 as an ensemble of discrete components communicating with each other via distinct data signal connections, it will be understood by those skilled in the art that the system is provided by a combination of hardware and software components, with some components being implemented by a given function or operation of a hardware

25

or software system, and many of the data paths illustrated being implemented by data communication within a computer application or operating system. The structure illustrated in Figure 1 is thus provided for efficiency of teaching the present preferred embodiment.

5           A key feature of this invention is the use of high performance 3D graphics chips to perform a multitude of video special effects and compositing. Within the context of the system architecture of this invention, the 2D and 3D command functions found in standard high performance graphics chips can be used for video processing. These commands can be considered as a set of basic instructions. By  
10 combining these commands with the correct parameters and in the correct sequence, virtually any visual effects can be achieved in real-time.

          These visual effects include all the standard classes of effects used in video production including but not limited to wipes, dissolves, keys, borders, drop shadows, trails, sparkles, 2D and 3D DVE's, surface and object morphing, explosions,  
15 multilayer compositing, anti-aliasing, spotlights and high lights, etc.

          Of particular importance is the concept of using the video input buffers as source textures for 3D texture mapping. This concept allows live video streams to be mapped onto any conceivable surfaces or objects. The target surface or object can move, change orientation, transition, or morph as a function of time.

20           The repertoire of 2D and 3D functions used includes but is not limited to the following: color and pattern fill, bitblt and stretch blt, plane and byte write mask, block write, color keying, video or graphic overlay, look up table based RGBalpha or YUV alpha gamma correction, programmable color space conversion, video proc amp controls (brightness, contrast, hue, saturation), 3D perspective correct or non  
25 perspective correct texture mapping with bilinear, trilinear, and anisotropic filtering, textures with clamp, mirror, fixed border color, non power of 2 textures, mip mapping including real-time generation of mip maps from video surfaces, palettized textures, environment bump mapping, cubic environment mapping, Gouraud and specular lighting, multifunction alpha blending as described but not limited to the description in  
30 Microsoft DX6,7 and 8, fog, stencil, Z and W depth buffering, stencil, edge vector

based anti-aliasing, full scene anti-aliasing, fragment buffer based anti-aliasing, rendering to a texture or using the rendering engine to create a new source texture, multipass rendering to achieve compositing and other effects, hardware transform and lighting, pixel shaders and vertex shaders as described in Microsoft DX8 specification.

5 A real-time video stream source 10, such as a camera or a video tape recorder, is connected to a video decoder 11 whose uncompressed digital stream output signal is fed into a CODEC 12 on a first, dedicated, video bus 40. The CODEC 12 is capable of video stream compression and decompression in real-time. The  
10 CODEC 12 can also receive compressed video stream from an external device 37 such as Fire Wire (IEEE 1394) (DV Camcorder) or SDTI. In another embodiment, the architecture comprises at least two CODEC 12 in order to divide the processing time. This external device 37 is connected to a compressed source interface 38 which is connected to the source controller 29. In the preferred embodiment the compressed  
15 source interface converts incoming signals from the compressed source interface 38 into DV25 format. In another embodiment, the architecture comprises a compressed source interface 38 for each available compressed video source 37. The first video bus 40 allows the decoder 11, the CODEC 12 and the video encoder 27 to communicate an uncompressed real-time video stream. The CODEC 12 is connected  
20 to video bus 41 which allows the CODEC to output in real-time video fields of two uncompressed video streams to the input ports 13 and 14 of the video stream input buffers 15 and 16 of the graphics accelerator chip 36. In the preferred embodiment, a single bus TDMNX (with time division multiplexing to support multiple streams of video) is used. The input ports 13 and 14, and the video stream input buffers 15 and  
25 16 are controlled by a video input buffer controller 19. The goal of the input ports 13 and 14 is to select memory locations in each video stream input buffers 15 and 16 according to the video input buffer controller 19. These memory locations will receive the video streams. In the preferred embodiment, the graphics chip 36 is preferably a Matrox G400.



The CODEC 12 is controlled by the source controller 29. In the preferred embodiment, the CODEC 12 is a C-Cube DV25/MPEG2. The source controller 29 has access to a video data storage 31. The source controller 29 also controls the video input buffer controller 19. An input buffer controller 18 controls the graphic input buffer 17 which is connected to the 3D rendering engine. The 3D rendering engine receives data streams from the video stream input buffers 15 and 16.

Although it will be appreciated that various architectures for video editing software are possible, there is illustrated in Figure 1 a video editing controller 32 which represents the video editing user interface and controller processing associated with the application level. The video editing controller 32 may comprise, for example, the Adobe Premiere™ software package. For each specific video effect made available according to the preferred embodiment, a video effect filter module 20 is provided. An example of the video effect filter 20 is fade effect, 3D perspective effect, organic wipe effect etc. The video effect control module 30 commands the source controller 29 to retrieve specific video data files from the video data storage 31. The video effect control module 30 also commands the input buffer controller 18 and the output buffer controller 33. The output buffer controller 33 can generate an address signal which specifies a current field address. This current field address is sent to the output port 26, which will retrieve the corresponding field from the output buffer 25. The corresponding field can be then transmitted to the video encoder 27 and then to the display 28. In the preferred embodiment, the output buffer 25 has a large number of fields, the number of field is greater than 6.

The video effect control module 30 provides keyframes to the desired one of the video effect filters 20, 20', 20" etc.. In response, the video effect filter 20 sends commands to the graphics engine command interface 21 of the graphics chip 36 to implement the desired video processing within the graphics chip 36. The video effect control module 30 also sends commands to the graphics engine command interface 21. The keyframe data describes the functionality of the effects and the graphics engine command interface 21 interprets the keyframe data to determine what specific graphics engine command is required. In the case of a video processing task

requiring the capabilities of the 3D rendering engine 24, the graphics engine command interface 21 specifies the triangle and triangle meshes on which to map a video field with a resulting 3D perspective correct or non-perspective correct effect. Such an object is stored in memory 22 by data signal 42 and defined by the parameters for the vertices of the triangle or triangle meshes on which the video is to be mapped. Using the command data signal 45, the graphics engine command interface 21 is instructed to invoke either the 3D rendering engine 24 or the 2D graphics engine 23 to execute the desired video effect function and provide a result field for output buffer 25.

In the case of the 3D rendering engine 24, the graphics engine command interface 21 provides a specific command to the 3D engine 24 to map a selected one of the fields taken from one of the buffers 15, 16 and 17, thus obtaining a transformed field.

For the sake of the description, four video effects are herein disclosed. These effects are the fade effect, the 3D perspective effect, the organic wipe effect and the page curl effect.

#### **The Fade Effect**

The fade effect is probably the most simple graphics effect that can be performed. It consists in performing a transition between two video sources. In order to complete this video effect, two steps are needed. During the first step, the background source is copied (Blit) into the destination buffer. During the second step, a texture mapping involving the other video source and the destination buffer is performed. The texture mapping (TMAP) is performed with a blend factor chosen by the user.

In the case of the preferred embodiment, the video effect is implemented within the video FX filter 20. According to fig 2, and in the first step 51, the user chooses using the video editing controller 32 parameters that are going to be used for the effect. These parameters comprise the fade threshold control being a blend

factor. These parameters will be sent to the graphics engine 36 via the graphics engine command interface 21.

In the second step 52, the user selects the video sources to be used in the effect using the video effect control module 30. The video effect control module 30 sends the information to the source controller 29. The video input buffer controller 19 then sends addresses to the input ports 13 and 14. These addresses will correspond to the location where the video frames will be stored inside the video stream input buffer. The two video sources are either real-time video stream sources or they are provided by the video data storage 31. The codec 12 insures that the video streams are real-time video streams. These two video streams go into the video stream input buffers 15 and 16 via the input port 13 and 14. One of these video streams is read by the 2D graphics engine 23 according to the first step of the video effect.

In the third step 53, the video effect control module 30 sends command to the graphics engine command interface 21 to carry out a Blit, using the 2D engine, from one selected present video input buffer (15 or 16) into a destination buffer 25 of the graphics engine 36.

In the fourth step 54, the video effect control module sends a command to the graphics engine command interface 21, this command relates to a texture mapping operation involving the other video source and the destination buffer 25 of the graphics engine 36. The texture mapping is handled by the 3D rendering engine 24.

In the fifth step 55, a feedback command is sent by the graphics engine command interface 21 to the video effect control module 30. This feedback is performed using an interruption. A service routine is called and a system event is signalled when the interruption is generated. This feedback allows the video effect control module 30 to monitor processes.

### **The 3D perspective Effect**

The 3D perspective effect is more complicated than the fade effect. In one embodiment, this video effect is performed using four processing operations. The first operation consists in performing a copy (Blit) of one of the two video sources referred

as the background source into the destination buffer. This action is similar to the first step of the fade effect described above.

The second operation in the 3D perspective effect is a texture mapping of the second video source with soft edges and transparency in a scratch buffer.

5 The third operation in the 3D perspective effect involves a Gouraud shading of the borders in the scratch buffer.

The fourth operation in the 3D perspective effect involves the generation of shadow using alpha of the modified source contained in the scratch buffer. Then the second part of this operation involves the rendering of the perspective using the scratch  
10 buffer data.

In the case of the preferred embodiment, the video effect is implemented within the video FX filter 20. According to fig 3, and in the first step 60, the user chooses, using the video editing controller 32, parameters that are going to be used for the effect. These parameters comprise the transparency control, soft edges  
15 characteristics, Gouraud parameters, the 3D world transformation matrix, the drop shadow parameters (drop shadow color, drop shadow position).

In the second step 61, the user selects the video sources to be used in the effect using the video effect control module 30. The video effect control module 30 sends the information to the source controller 29. The two video sources are either  
20 real-time video stream sources or they are provided by the video data storage 31. The codec 12 feeds real-time video streams. These two video streams go into the video stream input buffers 15 and 16 via the input port 13 and 14.

In the third step 62, the video effect control module 30 sends command to the graphics engine command interface 21 to carry out a Blit, using the 2D graphics  
25 engine 23, from one selected present video input buffer (15 or 16) into a destination buffer 25 of the graphics engine 36.

In the fourth step 63, the video effect control module 30 sends vertices to the graphics engine command interface 21. These vertices will be sent to the 3D rendering engine 24 via the object specification memory 22. These vertices are used  
30 at this step to perform a texture mapping of one selected video source. This texture

mapping is done with soft edges and transparency according to the parameters chosen by the user via the video editing controller 32. This texture mapping is performed by the 3D rendering engine 24. The result is stored into a scratch buffer, located within the graphics engine 36.

5 In the fifth step 64, the graphics chip applies Gouraud shading to the scratch buffer. This Gouraud shading is performed by the 3D rendering engine 23 according to parameters received by the graphics engine command interface 21.

10 In the sixth step 65, generation of shadow using the alpha of the scratch buffer is performed. This is performed according to informations received by the graphics engine command interface 21 and transmitted to the 3D graphics engine 24 which will perform the task.

15 In the seventh step 66, the rendering of the perspective is done using the scratch buffer and the destination buffer 25. This is performed using the 3D rendering engine 24 and according to commands issued by the graphics engine command interface 21.

20 In the eighth step 67, a feedback command, similar to the feedback command described in the fade effect, is sent by the graphics engine command interface 21 to the video effect control module 30. This feedback allows the video effect control module 30 to monitor processes.

### **The organic Wipe Effect**

25 The organic wipe effect is performed, in one embodiment, using three different operations. The first operation consists of copying the background source into the destination buffer. The second operation consists of passing a defined grey scale pattern into a palette expansion unit. The third operation consists in doing a texture mapping between two video sources and modulating this texture mapping using the palette expanded grey scale pattern image.

30 In the case of the preferred embodiment, the video effect is implemented within the video FX filter 20. According to fig 4, and in the first step 70, the user chooses, using the video editing controller 32, parameters that are going to be used

In the second step 71, the user selects the video sources to be used in the effect using the video effect control module 30. The video effect control module 30 sends the information to the source controller 29. The two video sources are either real-time video stream sources or they are provided by the video data storage 31. The codec 12 insures that the video streams are real-time video streams. These two video streams go into the video stream input buffers 15 and 16 via the input port 13 and 14.

In the fourth step 73, the grey scale pattern which is stored inside the graphics engine 36 is partly sent, according to a softness threshold, to another location inside the graphics engine 36. The graphics engine command interface 21 sends this order to the 3D rendering engine 24 according to the video effect control module 30.

In the sixth step 75, a feedback command, similar to the feedback command described in the fade effect, is sent by the graphics engine command interface 21 to the video effect control module 30. This feedback allows the video effect control module 30 to monitor processes.

To achieve a page curl effect, a number of video and graphics processing steps are required before the final video field can be output to buffer 25. The page

curl effect is, as the previous effects described above, one example of an unlimited variety of effects that can be achieved with this invention. More precisely, to achieve a page curl, the video effect filter 20 will determine, based on the keyframe data, the exact object data for the particular state of the page curl and output this to the object specification memory 22. The object specification memory contains as series of 2D and 3D graphics commands with necessary parameters to construct the desired effect.

The page curl surface is broken up into a triangle mesh. The triangle mesh provides a means of texture mapping the video input source texture buffer onto the curved surface. This triangle mesh is broken up into a series of perspective correct triangle texture mapping commands to the 3D graphics engine 24. To improve the appearance of the page curl, the graphics hardware may be commanded to create mip maps of the video input surface 1 and 2. These mip map surfaces may be used with trilinear or anisotropic filtering on each video texture mapped triangle by 3D rendering engine 24. The rendering engine renders the texture mapped triangles into output buffer 25. In addition, Gouraud or specular lighting may be applied to achieve the effect of a specular highlight. Anti-aliasing may be applied to the edges of the page curl to remove jagged edges. Since the curled page reveals an underlying image (even if it is simply a background blank), it is preferred to blend the image of the curled page with a second field for the underlying image.

In the case that graphics titles are to be overlaid during the video editing, the video effect control module 30 takes the selected graphics from a graphics overlay memory 34 and outputs the field images, in RGB or other desired format, to the graphics input buffer 17 via the input buffer controller 18 and the video effect filter 20 commands via the graphics engine command interface 21 either the 3D rendering engine or the 2D graphics engine to overlay or blend or render the desired image using the graphics field.

It is important to notice that data coming from the graphic input buffer 17 are handled like data coming from the video stream input buffers 15 and 16, meaning

that it is possible to achieve video effects with video frames coming from the graphic input buffer 17.

The graphics engine command interface 21 provides feedback that a specific graphics engine command has been successfully executed using a return  
5 command path 43. In the preferred embodiment, this feedback command is issued when a video field is entirely rendered. For instance, this can be done after two video effects If two video effects are applied to a single field. In the effects described above (fade effect, 3D perspective effect and organic wipe effect), and only for the purpose of the description, each field is handled by only one effect. The graphics engine  
10 command interface 21 processes instructions in a stack. Data signal 43 is used by the video effect control module 30 to confirm that the processing is being carried out in real-time, this is done by counting free fields in the output buffer 25. If the video effect control module 30 detects that the graphics chip 36 has not been able to complete quickly enough the requested video image processing, and that the output  
15 buffer 25 may be depleted, the video effect control module 30 may change, in one embodiment, the nature of the keyframe data either to specify that simpler video effects are to be performed or that a given frame or number of frames should be skipped in order to ensure that the remainder of the video editing takes place in real-time without the video output buffer 25 being depleted. In another embodiment, the  
20 video effect control module 30 may also inform the video editing controller 32 that the graphics chip 36 has not been able to complete quickly enough the requested video image processing, and that the output buffer 25 may be depleted. According to user preferences, the video editing controller 32 may inform the user with a pop up message.

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What is claimed is:

1. A video editing apparatus for performing video editing in realtime of at least two video streams derived from a codec able to retrieve two video sources from a data storage device and output two uncompressed video data streams, the apparatus comprising:

a video data storage device;

a graphics processor having at least two video inputs and a video output;

a video decoder having a video signal input and an uncompressed digital video output;

a video encoder having an uncompressed video data stream input and a display signal output;

a first video bus transferring data between said video output of said graphics processor and said video encoder when said apparatus is operating in a realtime video editing mode;

a second video bus transferring data between said codec and said at least two video inputs of said graphics processor when said apparatus is operating in a realtime video editing mode;

said video decoder using one of said first and said second video buses to transfer data to said video encoder in a non-editing playback mode, and said video decoder using one of said first and said second video buses to transfer data to said codec in a video capture mode.

2. The apparatus as claimed in claim 1, wherein said video decoder transfers data to said codec and to said video encoder using said first video bus.

3. The apparatus as claimed in claim 2, wherein data is transferred from said video output of said graphics processor to said codec for compression and storage in said video data storage device.

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4. The apparatus as claimed in claim 3, wherein said graphics processor has an input buffer for storing a sequence of fields of said at least two video inputs and an output buffer for storing a sequence of fields of said graphics processor video output.
5. The apparatus as claimed in claim 4, wherein said input buffer also stores input graphic image fields.
6. The apparatus as claimed in claim 1, wherein said graphics processor has an input buffer for storing a sequence of fields of said at least two video inputs and an output buffer for storing a sequence of fields of said graphics processor video output.
7. The apparatus as claimed in claim 6, wherein said input buffer also stores input graphic image fields.
8. The apparatus as claimed in claim 1, wherein said second video bus is a single bus communicating data multiplexed on said bus to all of said at least two video input.
9. The apparatus as claimed in claim 7, further comprising an input for compressed digital video input from external device, and a decompression device, one of said at least two video inputs comprising decompressed data from said compressed digital video input.
10. The apparatus as claimed in claim 9, wherein said compressed digital video input comprises one of an IEEE 1394 interface and an SDTI interface.

**ABSTRACT**

An architecture which allows real-time video editing using a 2D/3D graphics engine. This architecture comprises input and output buffers. It receives video streams from either compressed sources of data or non compressed sources of data. This architecture allows a flexible upgrade of the video effects using software plug ins.

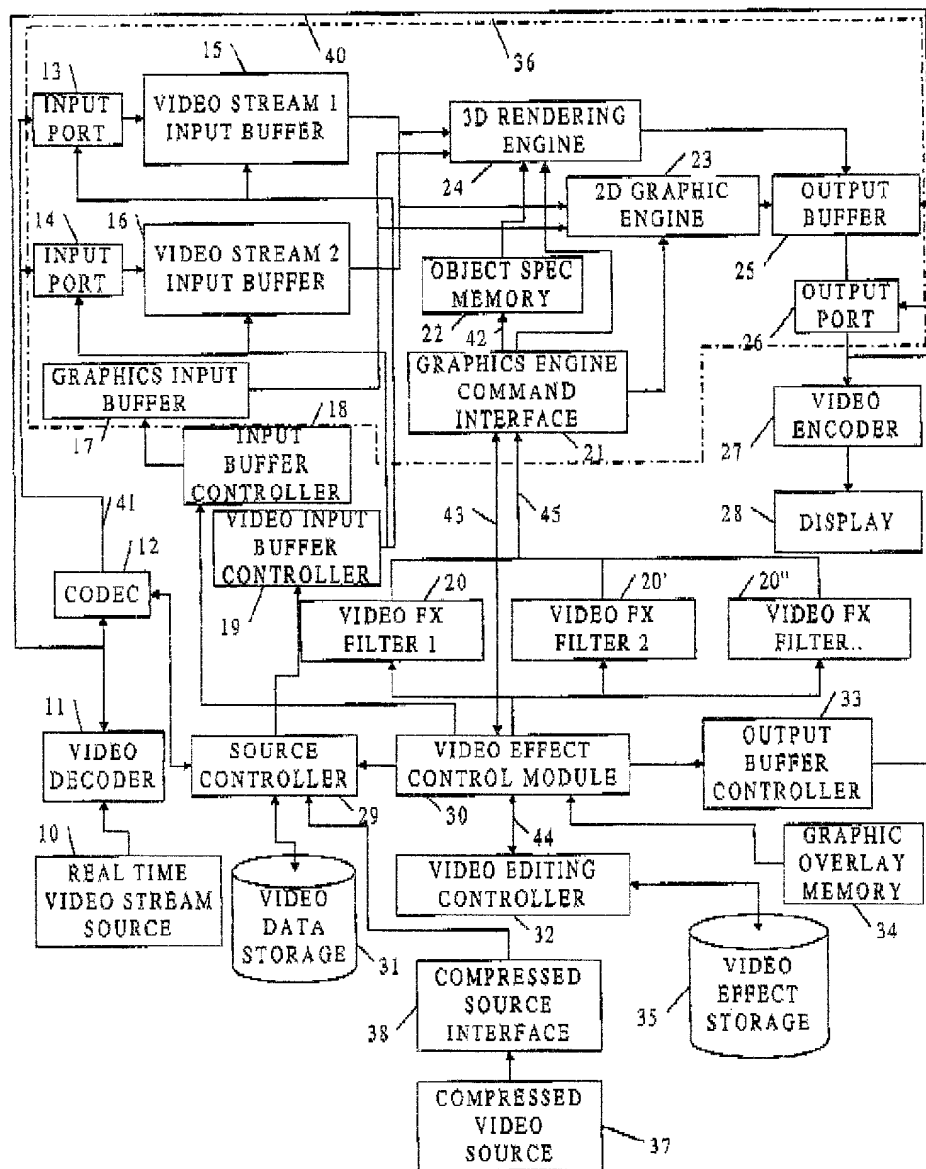


FIG 1

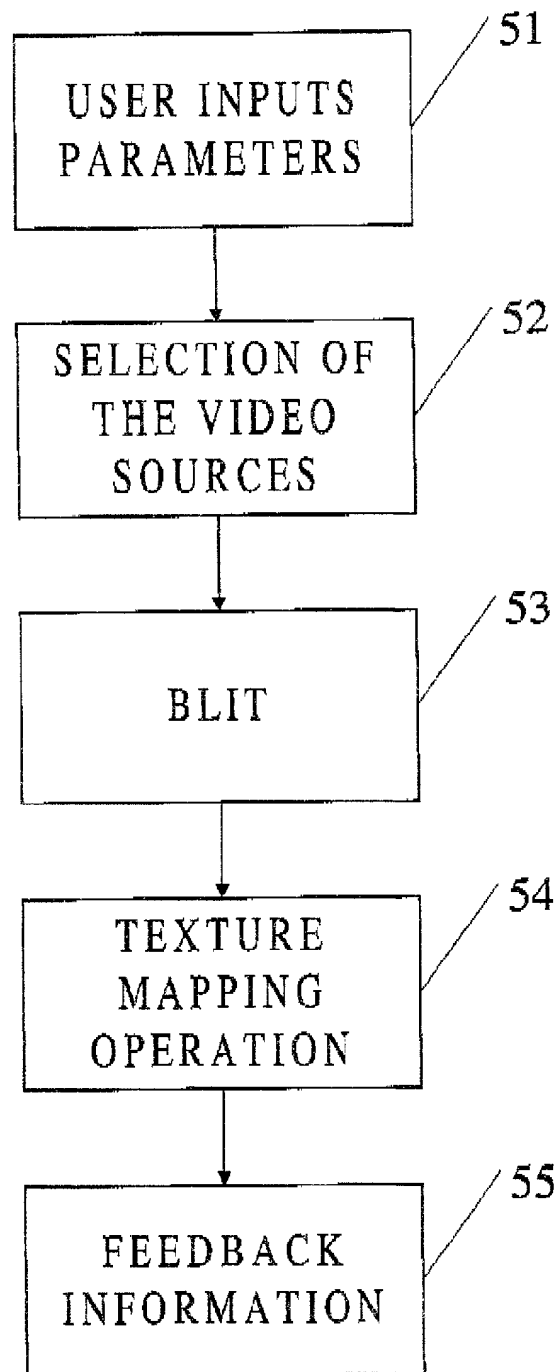
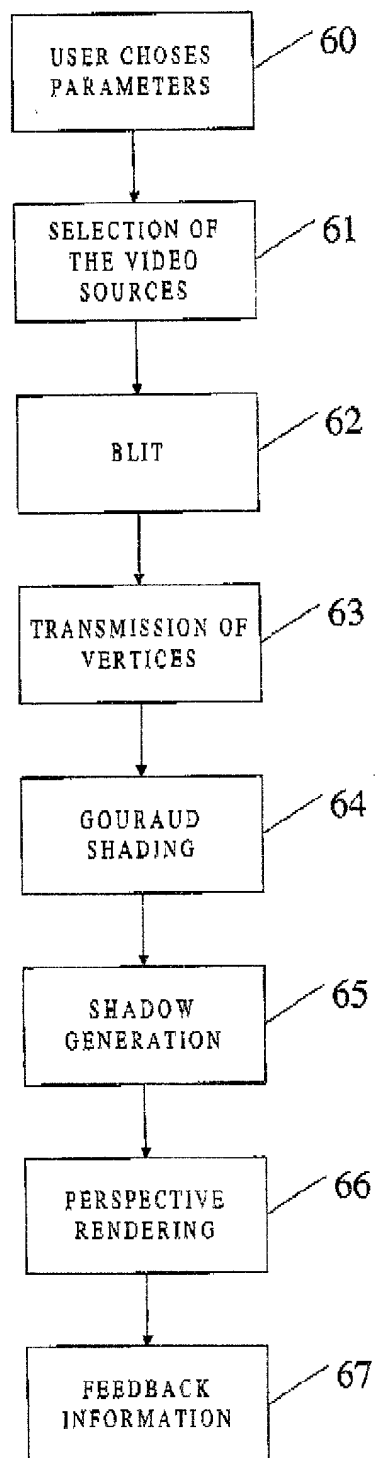


FIG 2



**FIG 3**

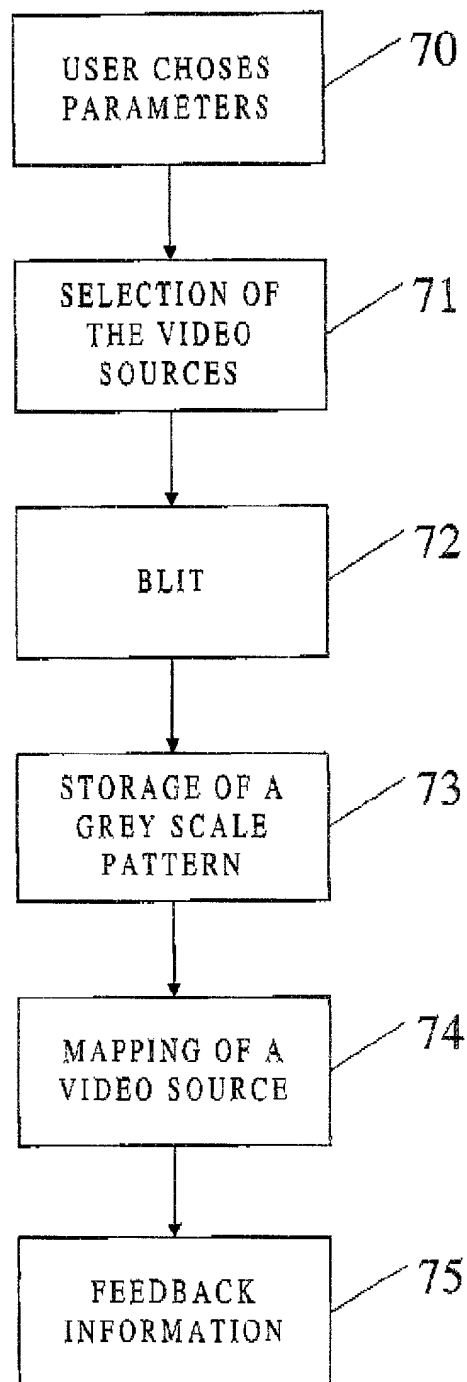


FIG 4

# Declaration and Power of Attorney for Patent Application

## Déclaration et Pouvoir pour Demande de Brevet French Language Declaration

En tant qu'inventeur ci-après désigné, je déclare par la présente que:

Mon domicile, mon adresse postale et ma nationalité sont tels que figurant ci-dessous à côté de mon nom.

Je crois être le premier inventeur original et unique (si un seul nom est mentionné ci-dessous), ou l'un des premiers co-inventeurs originaux (si plusieurs noms sont mentionnés ci-dessous) de l'objet revendiqué, pour lequel une demande de brevet a été déposée concernant l'invention intitulée

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

### "REAL-TIME VIDEO EDITING ARCHITECTURE"

et dont le mémoire descriptif est ci-joint à moins que la case suivante n'ait été cochée:

- ☐ a été déposée le \_\_\_\_\_ sous le numéro de demande des États-Unis ou le numéro de demande internationale PCT \_\_\_\_\_ et modifiée le \_\_\_\_\_ (le cas échéant).

Je déclare par la présente avoir révisé et compris le contenu du mémoire descriptif ci-dessus mentionné, incluant les revendications, telles que modifiées par toute modification ci-dessus mentionnée.

Je reconnais devoir divulguer toute information pertinente à la brevetabilité, tel que défini dans le Titre 37, §1.56 du Code fédéral des réglementations.

Je revendique par la présente la priorité étrangère, en vertu du Titre 35, §119(a)-(d) ou §365(b) du Code des États-Unis, sur toute demande étrangère de brevet ou certificat d'inventeur ou, en vertu du Titre 35, §365(a) du même Code, sur toute demande internationale PCT désignant au moins un pays autre que les États-Unis et figurant ci-dessous et, en cochant la case, j'ai aussi indiqué ci-dessous toute demande étrangère de brevet, tout certificat d'inventeur ou toute demande internationale PCT

the specification of which is attached hereto unless the following box is checked:

- ☐ was filed on Sept. 1, 2000 as United States Application Number or PCT International Application Number 09/unknown and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations., §1.56.

I hereby claim foreign priority under Title 35, United States Code, §119(a)-(d) or §365 (b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, listed below, and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application



### French Language Declaration

ayant une date de dépôt précédant celle de la demande à propos de laquelle une priorité est revendiquée.

on which priority is claimed.

Prior foreign application(s)

Priority Not Claimed

Demande(s) de brevet antérieure(s)

Droit de priorité non revendiqué

(Number)  
(Numéro)

(Country)  
(Pays)

(Day/Month/Year Filed)  
(Jour/Mois/Année de dépôt)

**C**

(Number)  
(Numéro)

(Country)  
(Pays)

(Day/Month/Year Filed)  
(Jour/Mois/Année de dépôt)



Je revendique par la présente tout bénéfice, en vertu du Titre 35, §119(e) du Code des États-Unis, de toute demande de brevet provisoire effectuée aux États-Unis et figurant ci-dessous.

I hereby claim the benefit under Title 35, United States Code, §119(a) of any United States provisional application(s) listed below.

(Application No./ N° de demande)

(Filing Date/ Date de dépôt)

(Application No./ N° de demande)

(Filing Date/ Date de dépôt)

Je revendique par la présente tout bénéfice, en vertu du Titre 35, §120 du Code des États-Unis, de toute demande de brevet effectuée aux États-Unis, ou en vertu du Titre 35, §365(c) du même Code, de toute demande internationale PCT désignant les États-Unis et figurant ci-dessous et, dans la mesure où l'objet de chacune des revendications de cette demande de brevet n'est pas divulgué dans la demande antérieure américaine ou internationale PCT, en vertu des dispositions du premier paragraphe du Titre 35, §112 du Code des États-Unis, je reconnais devoir divulguer toute information pertinente à la brevetabilité, tel que défini dans le Titre 37, §1.56 du Code fédéral des réglementations, dont j'ai pu disposer entre la date de dépôt de la demande antérieure et la date de dépôt de la demande nationale ou internationale PCT de la présente demande:

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s), or §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application No.)  
(N° de demande)

(Filing Date)  
(Date de dépôt)

(Status) (patented, pending, abandoned)  
(Statut) (breveté, en cours d'examen, abandonné)

(Application No.)  
(N° de demande)

(Filing Date)  
(Date de dépôt)

(Statut) (patented, pending, abandoned)  
(Statut) (breveté, en cours d'examen, abandonné)

**French Language Declaration**

Je déclare que toute les déclarations faites dans la présente sont à ma connaissance, véridiques et que toutes les déclarations faites à partir de renseignements ou de suppositions sont tenues pour véridiques; et de plus, que toutes ces déclarations ont été faites en sachant que toute fausse déclaration volontaire ou son équivalent est passible d'une amende ou d'une peine d'emprisonnement, ou des deux, en vertu de la Section 1001 du Titre 18 du Code des États-Unis, et que de telles déclarations volontairement fausses risquent de compromettre la validité de la demande de brevet ou du brevet délivré à partir de celle-ci.

**POUVOIR:** En tant qu'inventeur désigné, Je nomme par la présente l(les) avocat(s) et/ou agent(s) inclus sous le numéro de client officiel suivant, avec plein pouvoir de révocation et de substitution, chargés de poursuivre cette demande et de traiter toute affaire s'y rapportant avec l'Office des brevets et des marques: *(mentionner le nom et le numéro d'enregistrement).*

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the agents and/or attorneys included in the following Customer Number, with full power of substitution, association, and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: *(list name and registration number)*

Please send all correspondence and direct all telephone calls to: / Veuillez adresser toute correspondance et tout appel téléphonique à:



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|   |  |                                |
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| Full name of sole or first inventor (Nom complet de l'unique ou premier inventeur)<br><b>Lorne TROTTIER</b>                             | Citizenship (Nationalité)<br><b>Canadian</b>                   | Date (dd/mm/yyyy) (jj/mm/aaaa) |
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| Full name of second inventor (Nom complet du second co-inventeur)<br><b>Michel ST-PIERRE</b>  | Citizenship (Nationalité)<br><b>Canadian</b>                   | Date (dd/mm/yyyy) (jj/mm/aaaa) |
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